

APPENDIX 7-16.

GEOLOGIC OCCURRENCE AND USE OF SEEPS AND SPRINGS



GEOLOGY AND USE OF THE SEEPS/SPRINGS IN THE COAL LEASE AND ADJACENT AREAS  
GENWAL COAL COMPANY INCORPORATED  
CRANDALL CANYON MINE

SEEP/SPRING NUMBER	GEOLOGY	USE
SP-1	Base of Starpoint Formation over Masuk Shale Member of Mancos Shale	None
SP-2	Base of Starpoint Formation over Masuk Shale Member of Mancos Shale	None
SP-3	Sandstone bedding plane in Starpoint Formation	None
SP-4	Colluvium at head of landslide in blackhawk Formation	Wildlife
SP-5	Colluvium over sandstone in Starpoint Formation	None
SP-6	Sandstone bedding plane in Blackhawk Formation	Wildlife
SP-7	Snow patch at top of Castlegate Formation	Wildlife
SP-8	Snow patch at top of Castlegate Formation	Wildlife
SP-9	Sandstone/shale interface at Castlegate and Blackhawk Formation Contact	None
SP-10	Snow patch at base of Castlegate Formation	Wildlife
SP-11	Colluvium over sandstone of Castlegate Formation	None
SP-12	Base of sandstone (Price River Formation) in channel bottom	Wildlife
SP-13	Sandstone at head of slide in Price River Formation	Wildlife
SP-14	Fractured sandstone and soil in Price River Formation	Wildlife
SP-14a	Fractured sandstone and soil in Price River Formation	Wildlife
SP-14b	Fractured sandstone and soil in Price River Formation	Wildlife
SP-15	Colluvium over sandstone in Blackhawk Formation	None
SP-16	Sandstone at head of slide in Blackhawk Formation	Wildlife
SP-17	Sandstone/shale interface in Blackhawk Formation	Wildlife
SP-18	Sandstone bedding plane in Starpoint Formation	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP-19	Sandstone at head of slide in Blackhawk Formation	None
SP-20	Sandstone bedding plane in Starpoint Formation	None
SP-21	Sandstone bedding plane in Starpoint Formation	Wildlife
SP-22	Fractured sandstone over shale in Blackhawk Formation	None
SP-22A	Blackhawk Formation slide, Tufa Deposits	Wildlife
SP-23	Sandstone/shale interface in Blackhawk Formation	None
SP-24	Sandstone/shale interface in Blackhawk Formation	Wildlife
SP-25	Sandstone bedding plane in Starpoint Formation	None
SP-26	Road cut, sandstone bedding plane in Starpoint Formation	None
SP-27	Colluvium over sandstone in Starpoint Formation	None
SP-28	Road cut, sandstone bedding plane in Starpoint Formation	None
SP-29	Road cut, sandstone bedding plane in Starpoint Formation	None
SP-30	Sandstone shale interface in Blackhawk Formation	None
SP-31	Colluvium over sandstone in Blackhawk Formation	None
SP-32	Colluvium over sandstone in Blackhawk Formation	None
SP-33	Alluvium over sandstone in Blackhawk Formation	None
SP-34	Colluvium over sandstone in Blackhawk Formation	None
SP-35	Colluvium over sandstone in Blackhawk Formation	None
SP-36	Sandstone/shale interface in Blackhawk Formation	Wildlife
SP-37	Sandstone bedding plane in Blackhawk Formation	None
SP-38	Sandstone/shale interface in Blackhawk Formation	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP-39	Sandstone bedding plane in Blackhawk Formation	None
SP-40	Sandstone bedding plane in Blackhawk Formation	None
SP-41	Colluvium over sandstone in Blackhawk Formation	None
SP-42	Colluvium over sandstone in Blackhawk Formation	Wildlife
SP-43	Colluvium over sandstone in Blackhawk Formation	None
SP-44	Colluvium over sandstone in Blackhawk Formation	None
SP-45	Colluvium over sandstone in Blackhawk Formation	None
SP-46	Sandstone bedding plane in Castlegate Formation	None
SP-47	Sandstone bedding plane in Castlegate Formation	None
SP-47a	Base of North Horn Formation	Developed
SP-48	Colluvium over sandstone in Blackhawk Formation	None
SP-48a	Colluvium over sandstone in Blackhawk Formation	None
SP-48b	Colluvium over sandstone in Blackhawk Formation	None
SP-49	Sandstone bedding plane in road cut in Blackhawk Formation	None
SP-50	Sandstone/shale interface in slump in Blackhawk Formation	None
SP-51	Sandstone/shale interface in slump in Blackhawk Formation	None
SP-52	Colluvium over sandstone in Blackhawk Formation, w/travertine	Wildlife
SP-53	Fractured sandstone with travertine in Blackhawk Formation	Wildlife
SP-54	Fractured sandstone with travertine in Blackhawk Formation	Wildlife
SP-55	Fractured sandstone with travertine in Blackhawk Formation	Wildlife
SP-56	Fractured sandstone with travertine in Blackhawk Formation	Wildlife
SP-57	Fractured sandstone with travertine in Blackhawk Formation	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP-57a	Blackhawk Formation	Wildlife
SP-58	Fractured sandstone in Blackhawk Formation	Wildlife
SP-59	Colluvium over sandstone in Blackhawk Formation	Wildlife
SP-60	Sandstone bedding plane in Castlegate Formation	None
SP-61	Fractured sandstone in Price River Formation	Wildlife
SP-62	Sandstone/shale interface in Price River Formation	None
SP-63	Sandstone/shale interface in Price River Formation	None
SP-64	Fractured sandstone in Price River Formation	Wildlife
SP-65	Colluvium over sandstone in Price River Formation	Wildlife
SP-66	Sandstone/shale interface in Blackhawk Formation	None
SP-67	Sandstone bedding plane in Castlegate Formation	None
SP-68	Sandstone bedding plane in Castlegate Formation	None
SP-69	Sandstone bedding plane in Castlegate Formation	None
SP-70	Fractured sandstone in Price River Formation	Wildlife
SP-71	Sandstone bedding plane in Castlegate Formation	None
SP-72	Sandstone/shale interface in Price River Formation	None
SP-73	Sandstone/shale interface in Blackhawk Formation	None
SP-74	Sandstone/shale interface in Blackhawk Formation	None
SP-75	Sandstone/shale interface in Blackhawk Formation	None
SP-76	Sandstone/shale interface in Blackhawk Formation	Wildlife
SP-77	Sandstone/shale interface in Blackhawk Formation	None
SP-78	Sandstone bedding plane in Starpoint Formation.	None



SEEP/SPRING NUMBER	GEOLOGY	USE
SP-79	Sandstone bedding plane in Starpoint Formation.	None
SP-80	Sandstone bedding plane in Starpoint Formation	None
SP1-1	Alluvium on valley floor	Wildlife
SP1-2	Alluvium on valley floor	Developed
SP1-2a	Alluvium on valley floor	Wildlife
SP1-2b	Alluvium on valley floor	None
SP1-3	Fractured sandstone in Price River Formation	Developed
SP1-3a	Alluvium	None
SP1-4	Fractured sandstone in Price River Formation	Wildlife
SP1-4a	Blackhawk Formation	Wildlife
SP1-4a1	Blackhawk Formation	None
SP1-4b	Price River Formation	None
SP1-4b1	Blackhawk Formation	None
SP1-4c	Blackhawk Formation	None
SP1-5	Fractured sandstone in Price River Formation	Wildlife
SP1-6	Fractured sandstone in Price River Formation	Wildlife
SP1-7	Fractured sandstone in Price River Formation	Wildlife
SP1-8	Fractured limestone in North Horn Formation	Wildlife
SP1-9	Fractured limestone in North Horn Formatio	Wildlife
SP1-10	Contact between North Horn and Price River Fms.	Wildlife
SP1-10a	Price River Formation	Wildlife
SP1-10b	Contact between North Horn and Price River Formations	Wildlife
SP1-11	Fractured limestone in North Horn Formation	Developed
SP1-12	Fractured limestone in North Horn Formation	Wildlife
SP1-13	Fractured limestone in North Horn Formation	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP1-13a	Fractured limestone in North Horn Formation	Wildlife
SP1-13b	Fractured limestone in North Horn Formation	Wildlife
SP1-13bb	North Horn Formation	Wildlife
SP1-13c	North Horn Formation	Wildlife
SP1-13d	North Horn Formation	Developed
SP1-14	Fractured limestone in North Horn Formation	Wildlife
SP1-15	Fractured limestone in North Horn Formation	Wildlife
SP1-16	Fractured limestone in North Horn Formation	Wildlife
SP1-16a	Fractured limestone in North Horn Formation	Wildlife
SP1-17	Fractured limestone in North Horn Formation	Wildlife
SP1-17a	Fractured limestone in North Horn Formation	Wildlife
SP1-18	Fractured limestone in North Horn Formation	Wildlife
SP1-18a	Fractured limestone in North Horn Formation	Wildlife
SP1-19	Fractured limestone in North Horn Formation	Wildlife & Livestock
SP1-20	Fractured limestone in North Horn Formation	Wildlife & Livestock
SP1-21	Fractured limestone in North Horn Formation	Wildlife & Livestock
SP1-21a	Fractured limestone in North Horn Formation	Wildlife & Livestock
SP1-21b	Fractured limestone in North Horn Formation	Wildlife & Livestock
SP1-22	Fractured limestone in North Horn Formation	Wildlife
SP1-23	Fractured limestone in North Horn Formation	Wildlife
SP1-24	Fractured limestone in North Horn Formation	Wildlife & Livestock
SP1-25	Fractured limestone in North Horn Formation	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP1-26	Fractured limestone in North Horn Formation	Wildlife
SP1-27	Fractured limestone in North Horn Formation	Wildlife
SP1-28	Fractured limestone in North Horn Formation	Wildlife
SP1-28a	Castlegate Formation	Wildlife
SP1-28b	Castlegate Formation	Wildlife
SP1-28c	Castlegate Formation	Wildlife
SP1-29	Fractured limestone in North Horn Formation	Wildlife
SP1-29a	Fractured limestone in North Horn Formation	Wildlife
SP1-29b	Fractured limestone in North Horn Formation	Wildlife
SP1-30	Fractured limestone in North Horn Formation	Wildlife
SP1-30a	Fractured limestone in North Horn Formation	Wildlife
SP1-30b	Fractured limestone in North Horn Formation	Wildlife
SP1-31	Fractured limestone in North Horn Formation	Wildlife
SP1-31a	Fractured limestone in North Horn Formation	Wildlife
SP1-32	Fractured sandstone in Price River Formation	Wildlife
SP1-32a	Fractured sandstone in Price River Formation	Wildlife
SP1-33	Alluvium in valley floor deposits.	Wildlife
SP1-34	Alluvium in valley floor deposits	Wildlife
SP1-35	Alluvium in valley floor deposits	Wildlife
SP1-36	Alluvium in valley floor deposits	Wildlife
SP1-37	Alluvium in valley floor deposits	Wildlife
SP1-37a	Alluvium in valley floor deposits	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP1-37b	Alluvium in valley floor deposits	Wildlife
SP1-38	Alluvium in valley floor deposits	Wildlife
SP1-38a	Alluvium	Wildlife
SP1-39	Alluvium in valley floor deposits	Wildlife
SP1-40	Alluvium in valley floor deposits	Wildlife
SP1-40a	Alluvium in valley floor deposits	Wildlife
SP1-41	Alluvium in valley floor deposits	Wildlife
SP1-41a	Alluvium in valley floor deposits	Wildlife
SP1-42	Alluvium in valley floor deposits	Wildlife
SP1-42a	Alluvium	Wildlife
SP1-43	Alluvium in valley floor deposits	Wildlife
SP1-43a	North Horn Formation	Wildlife
SP1-44	Alluvium in valley floor deposits	Wildlife
SP1-45	Alluvium in valley floor deposits	Wildlife
SP1-45a	Alluvium	Wildlife
SP1-46	Alluvium in valley floor deposits	Wildlife
SP1-47	Alluvium in valley floor deposits	Wildlife
SP1-48	Fractured sandstone in Price River Formation	Wildlife
SP1-48a	Price River Formation	Wildlife
SP1-49	Fractured sandstone in Price River Formation	Wildlife
SP1-49a	Price River Formation	Wildlife
SP1-50	Fractured sandstone in Price River Formation	Wildlife
SP1-50a	Price River Formation	Wildlife
SP1-51	Fractured sandstone in Price River Formation	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP1-51a	From Price River Formation	Wildlife
SP1-51b	From North Horn Formation	Wildlife
SP1-51c	North Horn Formation	Wildlife
SP1-52	Fractured sandstone in Price River Formation	Wildlife
SP1-53	Alluvium in valley floor deposits	Wildlife
1-53aa	Alluvium in valley floor deposits	Wildlife
1-53b	Alluvium in valley floor deposits	Wildlife
SP1-53a	Alluvium in valley floor deposits	Wildlife
1-53aa	Alluvium in valley floor deposits	Wildlife
SP1-53b	Alluvium in valley floor deposits	Wildlife
SP1-53c	Alluvium in valley floor deposits	Wildlife
SP1-54	Fractured sandstone in Price River Formation	Wildlife
SP2-1	Fractured limestone in North Horn Formation	Wildlife
SP2-2	Bottom of channel over limestone of North Horn Formation	None
SP2-2a	Bottom of channel over limestone of North Horn Formation	None
SP2-3	Colluvium over limestone from 200' x 150' area	Wildlife
SP2-3a	Alluvium	Wildlife
SP2-3b	Alluvium	Wildlife
SP2-4	Fractured limestone in North Horn Formation	Wildlife
SP2-5	Fractured limestone in North Horn Formation w/ travertine	Wildlife
SP2-6	From fractured limestone in North Horn Formation	Wildlife
SP2-7	Fractured limestone in North Horn Formation	Wildlife
SP2-8	Bottom of channel over limestone (North Horn Formation)	None



SEEP/SPRING NUMBER	GEOLOGY	USE
SP2-9	Fractured limestone in North Horn Formation	Developed
SP2-9a	North Horn Formation	Wildlife
SP2-10	Fractured limestone in North Horn Formation	Wildlife
SP2-11	Head of slump in sandstone/shale interface in Price River Formation	None
SP2-12	Colluvium/sandstone in Price River Formation	None
SP2-13	Fractured sandstone in Price River Formation	Wildlife
SP2-14	Fractured limestone in Price River Formation	Wildlife
SP2-15	Fractured sandstone in Price River Formation	Wildlife
SP2-15a	Price River Formation	Wildlife
SP2-15b	Price River Formation	Wildlife
SP2-16	Sandstone/shale interface in Price River Formation	None
SP2-17	Fractured limestone in Price River Formation	Wildlife
SP2-18	Fractured sandstone in Price River Formation (Diffuse)	None
SP2-19	Colluvium/Alluvium adjacent to channel	None
SP2-20	Colluvium/alluvium adjacent to channel	None
SP2-21	Fractured limestone in Price River Formation	Wildlife
SP2-21a	Blackhawk Formation	Wildlife
SP2-21b	Blackhawk Formation	Wildlife
SP2-22	Fractured limestone at head of slump in the Price River Formation	None
SP2-22a	Fractured limestone at head of slump in the Price River Formation	None
SP2-23	Fractured limestone Price River Formation	Wildlife
SP2-24	Fractured sandstone in Price River Formation	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP2-24a	Fractured sandstone in Price River Formation	Wildlife
SP2-24b	Fractured sandstone in Price River Formation	Wildlife
SP2-25	Colluvium over limestone in North Horn Formation	None
SP2-26	Sandstone over shale at head of small slump in North Horn Formation	None
SP2-27	Colluvium in channel bottom in Price River Formation	Developed
SP2-28	Sandstone/shale interface in Price River Formation	Wildlife
SP2-29	Fractured sandstone in Price River Formation	Wildlife
SP2-30	Fractured sandstone/shale interface in Price River Formation	Wildlife
SP2-30a	Fractured sandstone/shale interface in Price River Formation	Wildlife
SP2-31	Fractured sandstone/shale interface in Price River Formation	Wildlife
SP2-32	Fractured sandstone/shale interface in Price River Formation	Wildlife
SP2-32a	Fractured sandstone/shale interface in Price River Formation	Wildlife
SP2-32b	Fractured sandstone/shale interface in Price River Formation	Wildlife
SP2-33	Fractured sandstone/shale interface in Price River Formation	Wildlife
SP2-33a	Fractured sandstone in the Price River Formation	Wildlife
SP2-34	Fractured sandstone/shale interface in Price River	Wildlife
SP2-34a	North Horn Formation	Wildlife
SP2-35	Fractured sandstone/shale interface in Price River Formation	Wildlife
SP2-36	Fractured limestone swale in North Horn Formation	Wildlife
SP2-36a	Fractured limestone swale in North Horn Formation	Wildlife
SP2-36bw	Fractured limestone swale in North Horn Formation	Wildlife
SP2-36bm	Fractured limestone swale in North Horn Formation	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP2-36be	Fractured limestone swale in North Horn Formation	Wildlife
SP2-37	Fractured limestone in North Horn Formation	Wildlife
SP2-37a	Fractured limestone in North Horn Formation	Wildlife
SP2-38	Fractured limestone in North Horn Formation	Wildlife
SP2-38a	Fractured limestone in North Horn Formation	Wildlife
SP2-38b	Fractured limestone in North Horn Formation	Wildlife
SP2-38c	Fractured limestone in North Horn Formation	Wildlife
SP2-39	Fractured limestone in North Horn Formation	Wildlife
SP2-40	Fractured limestone in North Horn Formation	Wildlife & Livestock
SP2-40a	Fractured limestone in North Horn Formation	Wildlife & Livestock
SP2-40b	Fractured limestone in North Horn Formation	Wildlife & Livestock
SP2-40c	North Horn Formation	Wildlife
SP2-40d	North Horn Formation	Wildlife
SP2-40e	Price River Formation	Wildlife
SP2-41	Fractured limestone in North Horn Formation	Wildlife
SP2-42	Fractured sandstone in the Price River Formation	Wildlife
SP2-43	Fractured sandstone in the Price River Formation	Wildlife
SP2-43a	Fractured sandstone in the Price River Formation	Wildlife
SP2-44	Fractured sandstone in the Price River Formation	Wildlife
SP2-44a	Fractured sandstone in the Price River Formation	Wildlife
SP2-44a2	Price River Formation	Wildlife
SP2-44a3	Price River Formation	Wildlife
SP2-44a4	Price River Formation	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP2-44b	Fractured sandstone in the Price River Formation	Wildlife
SP3-2	Alluvium	Wildlife
SP3-3	Alluvium	Wildlife
SP3-4	Alluvium	Wildlife
SP3-5	Alluvium	Wildlife
SP3-6	Alluvium	Wildlife
SP3-7	Alluvium	Wildlife
SP3-8	Alluvium	Wildlife
SP3-9	Alluvium	Wildlife
SP3-10	Alluvium	Wildlife
SP3-10a	Alluvium	Wildlife
SP3-10b	Alluvium	Wildlife & Livestock
SP3-11	Alluvium	Wildlife
SP3-12	Slump in alluvium	Wildlife
SP3-13	Slump in alluvium	Wildlife
SP3-13a	Slump in alluvium	Wildlife
SP3-13b	Slump in Alluvium	Wildlife
SP3-14	Slump in alluvium	Wildlife
SP3-15	Slump in alluvium	Wildlife
SP3-16	North Horn Formation	Wildlife
SP3-16a	Alluvium	Wildlife
SP3-16b	Alluvium	Wildlife
SP3-17	Base of Castlegate Formation	Wildlife
SP5-1	Alluvium	Wildlife
SP5-1a	Alluvium	Wildlife
SP5-2	Alluvium on Blackhawk Formation	Wildlife
SP5-3	Alluvium on Blackhawk Formation	Wildlife
SP5-4	Price River Formation	Wildlife
SP5-5	Castlegate Formation	Wildlife
SP6-1	Alluvium	Wildlife
SP6-1a	Alluvium	Wildlife



SEEP/SPRING NUMBER	GEOLOGY	USE
SP6-2	Alluvium	Wildlife
SP6-3	Alluvium	Wildlife
SP6-3a	Alluvium	Wildlife
SP6-4	Slump in alluvium	Wildlife
SP6-5	Slump in alluvium	Wildlife
SP6-6	Slump in alluvium	Wildlife
SP6-7	Slump in alluvium	Wildlife
SP6-8	Slump in alluvium	Wildlife
SP6-9	Alluvium	Wildlife
SP6-10	Alluvium	Wildlife
SP6-11	Alluvium	Wildlife
SP6-11a	Alluvium	Wildlife
SP6-11b	Alluvium	Wildlife
SP6-12	Price River Formation	Wildlife
SP6-13	Blackhawk Formation	Wildlife
SP6-13a	Blackhawk Formation	Wildlife
SP6-13b	Blackhawk Formation	Wildlife
SP6-13c	Blackhawk Formation	Wildlife
SP6-13d	Blackhawk Formation	Wildlife
SP6-14	Castlegate Formation	Wildlife
SP6-15	Castlegate Formation	Wildlife
SP6-15a	Blackhawk Formation	Wildlife
SP6-15b	Blackhawk Formation	Wildlife
SP6-16	Castlegate Formation	Wildlife
SP7-1	Price River Formation	Wildlife
SP7-2	Blackhawk Formation	Wildlife
SP7-3	Blackhawk Formation	Wildlife



GEOLOGIC OCCURRENCE AND USE OF SEEPS/SPRINGS  
FOUND DURING THE JUNE AND OCTOBER 1992 SURVEYS

Field Number	Geology	Use
SP1-4a(1)	From Blackhawk Formation	Wildlife
SP1-4b(1)	From Blackhawk Formation	Wildlife
SP1-4c	From Blackhawk Formation	Wildlife
SP1-13bb	From Blackhawk Formation	Wildlife
SP1-13c	From Blackhawk Formation	Wildlife
SP1-13d	From Blackhawk Formation	Wildlife
SP1-37b	From Joes Valley alluvium	Wildlife
SP3-10a	From Scad Valley alluvium	Wildlife
SP3-10b	From Scad Valley alluvium	Wildlife
SP3-13a	From Castlegate Formation	Wildlife
SP3-13b	From Castlegate Formation	Wildlife
SP3-16a	From Scad Valley alluvium	Wildlife
SP3-16b	From Scad Valley alluvium	Wildlife
SP5-1a	From Scad Valley alluvium	Wildlife
SP6-3a	From Scad Valley alluvium	Wildlife
SP6-11a	From Scad Valley alluvium	Wildlife
SP6-11b	From Scad Valley alluvium	Wildlife
SP6-13a	From Castlegate Formation	Wildlife
SP6-13b	From Castlegate Formation	Wildlife
SP6-13c	From Castlegate Formation	Wildlife
SP6-13d	From Blackhawk Formation	Wildlife
SP6-15a	From Blackhawk Formation	Wildlife
SP6-15b	From Blackhawk Formation	Wildlife
SP7-1	From Price River Formation	Wildlife
SP7-2	From Starpoint Formation	Wildlife
SP7-3	From Starpoint Formation	Wildlife